

# **FINAL REPORT**

April 4, 1994

## **EIGHTH FLOOR LOAD STUDY**

**OF**

**UNITED STATES FEDERAL BUILDING  
517 GOLD AVE. SW, ALBUQUERQUE, NEW MEXICO**

BUILDING NO.: NM0024ZZ  
PROJECT NO.: RNM94133

**FOR**

**GENERAL SERVICES ADMINISTRATION  
REGION 7**

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## **EIGHTH FLOOR LOAD STUDY**

U.S. FEDERAL BUILDING  
517 GOLD AVE. SW  
ALBUQUERQUE, NEW MEXICO  
BUILDING NO.: NM024ZZ  
PROJECT NO.: RNM94133

### **1. SCOPE**

This report provides results of a study of the live loads on the eighth floor of the Albuquerque Federal Building at 517 Gold Ave. SW as they existed on Feb. 7 and 8, 1994, and compares these loads to the allowable live loads calculated during the previous analysis of the eighth floor structure.

The scope of this load study and analysis is as follows:

1. Conduct a site visit to the building to document, locate, and inventory all existing loads on the eighth floor slab. Develop an inventory list in sufficient detail to determine the existing live loads in each room and each bay of the eighth floor. The loads in each area have been estimated by consulting available manufacturer's information and other published data on average weights, weighing the media on site, and appropriately estimating the weights of individual items as necessary. Input from the Corps of Engineers was received on the weights of standard modular office furniture, computer equipment in the computer room, and the Lektrievers on levels 8 and 7.
2. Utilizing the data gathered during the site visit and weight investigation, conduct a structural analysis as necessary to compare the existing loads on the eighth floor to the allowable live load capacities determined by the previous structural analysis of the eighth floor slab.
3. Based on the results of the structural analysis and load comparison in paragraph 2 above, determine those areas of the eighth floor where the existing live load exceeds the allowable live load capacity, and should be reduced. Develop a plan showing these areas.
4. Coordinating closely with the GSA Building Manager and the Corps of Engineers, develop a plan for the required relocation and/or removal of any equipment, files, furniture, etc., and conduct any additional structural analysis necessary to determine if the existing live loads are within the calculated live load capacities of the floor slab.

## 2. SITE SURVEY

The site survey was conducted on Feb. 7 and 8, 1994. Prior to the site survey, the weights for standard filing cabinets, paper files, and books were determined using published standard load information. The weights for computer equipment in the computer room, and Lektriever units were supplied by the Corps of Engineers. The raised computer floor in the computer room was weighed using a bathroom scale and determined to weigh approximately 10 pounds per square foot. The weights for standard modular office furniture were determined by consulting manufacturer's information. After the site survey was complete, additional inventory and manufacturer information on the modular furniture was received from the Corps of Engineers. This information was consistent with the initial study of manufacturer's information, and indicated an average weight of 1,000 lbs. to 1,200 lbs. for furniture in a typical modular office.

Weights for typical office furniture such as desks, chairs, conference tables, credenzas, etc. were determined by weighing them with a bathroom scale. Where storage cabinets or other furniture could not be lifted to place it on the scale, the weights were estimated based on the type of contents and the published values for the contents. Weights for bookcases were calculated based on the size of the bookcase and the number of shelves, using the standard weight for books. The weight of the bookcase itself was estimated based on the size and type of construction. The weights for the large copy machines in the Room 8023 were obtained from the manufacturer.

The inventory of contents was completed so all weights could be assigned to a floor bay at the eighth floor as well as a room number or room designation. Where one room occupied space in more than one bay, the loads from contents in that room were assigned to the bay in which they occupied space. This was done so that total existing live load could be determined for each bay of the eighth floor, and comparisons with the calculated allowable live loads could be drawn on a bay by bay basis.

## 3. CALCULATION OF EXISTING LIVE LOADS

After the site survey and inventory of contents was complete, weights were assigned to each of the items on the inventory list. The weights for each of the items on the inventory list was totaled to determine the total weight for contents in each of the bays. The total contents weight for the bay was divided by the area of the bay to determine the contents weight in pounds per square foot. An additional live load of 4 pounds per square foot was added to the contents weight to account for building occupants. At a typical 25 foot by 25 foot bay, the 4 psf allowance for occupants results in a total weight for the bay of 2,500 pounds, or approximately 10 to 15 people.

The estimated total live loads (contents plus occupants) existing on the eighth floor at the time of the site survey, and as calculated by the procedures above, are shown on Figure 1. The existing live loads are shown for each bay compared to the calculated allowable live

load from the previous structural investigation and analysis. The allowable live loads shown on Figure 1 include 20 psf for movable partitions per Uniform Building Code requirements. The actual partition weights for more typical interior and exterior bays were calculated based on information contained in the original contract drawings and investigation during the site survey. These calculations indicated that the weight of partitions is approximately 14 psf at the interior bays and approximately 18 psf at the exterior bays. The higher weight of partitions at the exterior bays is due to the masonry construction of the partitions at the main corridor. Most of the weight for these partitions is at the exterior bays. Partition walls between rooms at almost all locations of the exterior bays were found to be gypsum board on metal studs. The partition walls between rooms at the interior bays were also found to be gypsum board on metal studs at almost all locations. The reduced weight from the masonry corridor walls at the interior bays is the reason for the lower partition load at these bays. There will be some variation in the actual partition loads at the exterior and interior bays, but the actual partition loads at all bays appear to be within the 20 psf partition allowance.

#### 4. RECOMMENDATIONS FOR REDUCTION OF LIVE LOAD

For many of the bays at level 8, the existing live loads exceed the allowable live loads as shown on Figure 1. At bays where no reduction of live load is required over the short term, the existing live loads are indicated with an asterisk. Where the estimated existing live loads exceed the allowable live loads by no more than 10 to 12 psf, reduction of live load is not needed in the next four to six months, but great care must be taken that the existing live loads are not increased above their present level. If possible, the live loads at these bays should be reduced by removing contents so actual live loads are equal to, or slightly more than the allowable live loads. A 10 to 12 psf overload on the floor will create an overstress of approximately 10% at these areas, but a factor of safety of approximately 1.35 or greater will still be provided. The factor of safety is calculated by dividing the factored allowable total load by the actual total load at the bay under consideration. In the long term, the live load should be reduced to be equal to or less than the allowable live loads shown on Figure 1, or the slab should be reinforced to increase the punching shear and live load capacity as discussed in the strength evaluation and structural analysis report.

At bays where live load reduction is recommended, the existing live loads are indicated inside a circle. This condition occurs at six bays. The existing live loads at these bays are greater than the allowable live loads by more than 10 to 12 psf. Areas where high live load should be reduced, and possible options for relocation of contents are shown on Figure 2. The following are initial recommendations at each bay where contents should be moved to reduce the existing live loads so they do not exceed the allowable live loads by more than 10 psf. Other options for relocation of contents are possible, and will need to be coordinated with the Building Manager and the Corps of Engineers based on their operational needs.

#### Bay Between Grids L&M and 3&4

The heavy files in room 8102 are the main reason for the overload at this bay. The live load at this bay should be reduced by approximately 4,500 lbs. This could be accomplished by removing ten of the 5 drawer file cabinets, or by removing the map file and five of the 5 drawer file cabinets. Other options are possible and can be coordinated with the Corps of Engineers. The files could be relocated to the bay between grids M&N and 2&3, or any of the adjacent bays where the allowable live loads equal 80 psf.

#### Bay Between Grids E&F and 1&2

The files and bookcases on the south wall of room 8423 are the main reason for the overload at this bay. The live load at this bay should be reduced by approximately 6,000 lbs. The live load at this bay could be reduced by relocating six 5 drawer file cabinets, three of the 3 foot wide bookcases, and the 3 foot wide by 7 foot high storage cabinet. Other candidates for relocation include the 5 drawer lateral file, and the extra paper storage in this bay. The contents removed from this bay could be relocated at any of the bays with 80 psf allowable live load which are located near the stairs at the east and west ends of the building.

#### Bay Between Grids C&D and 4&5

Room 8045 at this bay contains a number of desks combined with fairly extensive paper and book storage. The live load at this bay should be reduced by approximately 3,000 lbs. The live load at this bay could be reduced by relocating five of the 2 foot wide by 5 foot high bookcases, two of the 3 foot wide by 7 foot high bookcases, and one of the 3 foot wide by 4 foot high bookcases. Other candidates for relocation include the computer desks and associated paper materials. General paper storage and books contained in the bay could also be removed to reduce the live load. The contents removed from this bay could be relocated to the adjacent bay between grids B&C where the allowable live load equals 80 psf.

#### Bay Between Grids E&F and 4&5

The Lektriever at room 8017 is the main reason for the overload at this bay. The live load at this bay should be reduced by approximately 5,500 lbs. This reduction could be accomplished by relocating the Lektriever to either of the locations near the west stair as shown on Figure 2.

#### Bay Between Grids F&G and 3&4

The storage cabinets at room 8015 and the adjacent storage room, combined with the copiers and paper storage in the copy room 8023 are the main reason for the overload at this bay. The live load at this bay should be reduced by approximately 5,000 lbs. The live load at this bay could be reduced by relocating two of the 3 foot wide by 7 foot high storage cabinets and boxed paper storage in room 8015, along with four of the 3 foot wide by 6 foot high storage cabinets in the adjacent storage room. Another option would be to relocate all the contents in the copy room 8023. The contents removed from this bay could be relocated at any of the bays with 80 psf allowable live load which are located near the stairs at the east and west ends of the building.

#### Bay Between Grids D&E and 3&4

The heavy paper storage in room 8031 along with the bookcases and paper storage in room 8027 are the main reason for the overload at this bay. It should be noted that an allowance of 5,000 lbs. was provided for paper storage along the south wall of storage room 8031. This load was not in place at the time of the site survey, but was put in the inventory because Corps of Engineers personnel indicated that heavy paper storage along the south wall is very common. The live load at this bay should be reduced by approximately 16,000 lbs. The live load at this bay could be reduced by relocating all of the contents in the storage room 8031 and four of the 3 foot wide by 7 foot high bookcases in room 8027. The contents removed from this bay could be relocated at any of the bays with 80 psf allowable live load which are located near the stairs at the east and west ends of the building.

The live load at the bay between grids B&C and 1&2 is approximately 13 psf higher than allowable as shown on Figure 1. If possible, the live load at this bay should be reduced by approximately 1,800 lbs. This can be accomplished by removing three of the bookcases in room 8447 and relocating them to another location. This relocation of live load is not critical since the overload at this bay is not severe, but if some of the contents at this bay can be removed, we would recommend that this be done. If the existing live load cannot be reduced, great care should be taken that the live load in this bay is not increased.

Load analysis has indicated that the Lektriever in room 8114 combined other contents in this room do not produce live loads in excess of those allowable at this bay. The floor in this area has a live load capacity of 80 psf, so relocation of the Lektriever will not be required.

Load analysis at the computer room 8016A has indicated that the existing live load at the bay between grids J&K and 3&4 is approximately 8 psf larger than the allowable live load. Reduction of the live loads at this bay are not required over the next four to six months, but the live load should not be increased by adding new equipment or other contents. If some of the equipment or other contents in this bay can be moved to reduce the live load, we would recommend that this be done.

The large conference room 8214 near the elevators was nearly empty at the time of the site survey. The live load as it existed was very small due to the presence of only a few tables and chairs. The live load capacity at the conference room has been calculated 35 psf as shown on Figure 1. The number of occupants in the conference room should be limited to approximately 80 people per bay or one person for each 8 square feet to stay within the allowable live load. The weight of furniture or other contents should be limited to chairs and a few tables in conjunction with the 80 person occupancy limit.



## 5. LEVEL SEVEN LIMITED STUDY

A very quick walk-through and load study was done at level seven to see if there were any areas with existing heavy live loads that should be reduced or moved. Two banks of movable high density file storage cabinets exist at room 7437. Calculations indicate that the weight for each of the high density file storage banks based on field measurements is approximately 8,000 lbs. each for a total weight of approximately 16,000 lbs. The two file storage cabinets are placed in two separate bays, so the live load is fairly well distributed. The load due to furniture and other contents in other areas of room 7437 is fairly limited. Calculations have indicated that under present conditions, the live loads in room 7437 are approximately 40 psf which is the allowable live load in this area. An effort should be made to reduce the live load by removing unnecessary files at the file storage cabinets. Furniture or other contents should not be added at this room.

An area of concentrated bookcases exists at the bay between grids L&M and 4&5 in the open office area at the east end of the building. We would recommend that these bookcases be spread out over a larger area or the number of books be reduced to reduce the live load by approximately 2,500 lbs. at this bay.

## 6. REDUCTION OF LIVE LOAD

Subsequent to the recommendations being made to reduce the live loads as discussed in section 4, we have received correspondence from the Corps of Engineers which indicates that the live loads have been reduced by removing the following loads:

### Bay Between Grids L&M and 3&4

The live load has been reduced by removing ten of the 5 drawer file cabinets, or by removing the map file and five of the 5 drawer file cabinets from room 8102.

### Bay Between Grids E&F and 1&2

The live load has been reduced by removing six 5 drawer file cabinets, three 3 foot wide bookcases, one 3 foot wide by 7 foot high storage cabinet, and one 5 drawer legal file from room 8423.

### Bay Between Grids C&D and 4&5

The live load has been reduced by removing five 2 foot wide by 5 foot high bookcases, two 3 foot wide by 7 foot high bookcases, one 3 foot wide by 4 foot high bookcase, and general paper and book storage from room 8045.

### Bay Between Grids E&F and 4&5

The live load has been reduced by removing the Lektriever from room 8017.

Bay Between Grids F&G and 3&4

The live load has been reduced by removing two 3 foot wide by 7 foot high storage cabinets and the boxed paper storage in room 8015. Two 3 foot wide by 7 foot high paper storage cabinets have also been removed from the copy room 8023. A daily supply of copier paper equal to a maximum of 400 lbs. may be kept in the copy room 8023.

Bay Between Grids D&E and 3&4

The live load has been reduced by removing all of the contents from storage room 8031 with the exception of an absolute minimum quantity of plans and specifications. This load should be limited to a maximum of 500 lbs. Four of the 3 foot wide by 7 foot high bookcases have also been removed from room 8027.

A	B	C	D	E	F	G	H	J	K	L	M	N	1
10+20 17*	10+20 23*	10+20 20*	10+20 13*	10+20 (31)	10+20 21*	20+20 26*	25+20 18*	25+20 18*	25+20 18*	25+20 19*	80+20 20*	80+20 19*	1
20+20 17*	20+20 33*	20+20 33*	20+20 32*	20+20 27*	20+20 27*	35 +20	35+20 35*	35+20 35*	35+20 35*	150	STAIRS	80+20 29*	2
80+20 22*	STAIRS 150	20+20 19*	20+20 (59)	20+20 34*	20+20 (38)	35 +20	35+20 35*	35+20 43*	25+20 27*	25+20 (42)	30+20 18*	30+20 18*	3
80+20 17*	80+20 28*	10+20 (25)	10+20 21*	10+20 (29)	10+20 19*	20+20 26*	20+20 15*	25+20 21*	15+20 23*	15+20 19*	20+20 15*	20+20 15*	4
													5

NOTES:



1. ALLOWABLE LIVE LOADS ARE BASED ON  $f'_c = 2,100$  PSI FOR CONCRETE BASED ON TESTING RESULTS.

2. ALL LIVE LOADS IN PSF.

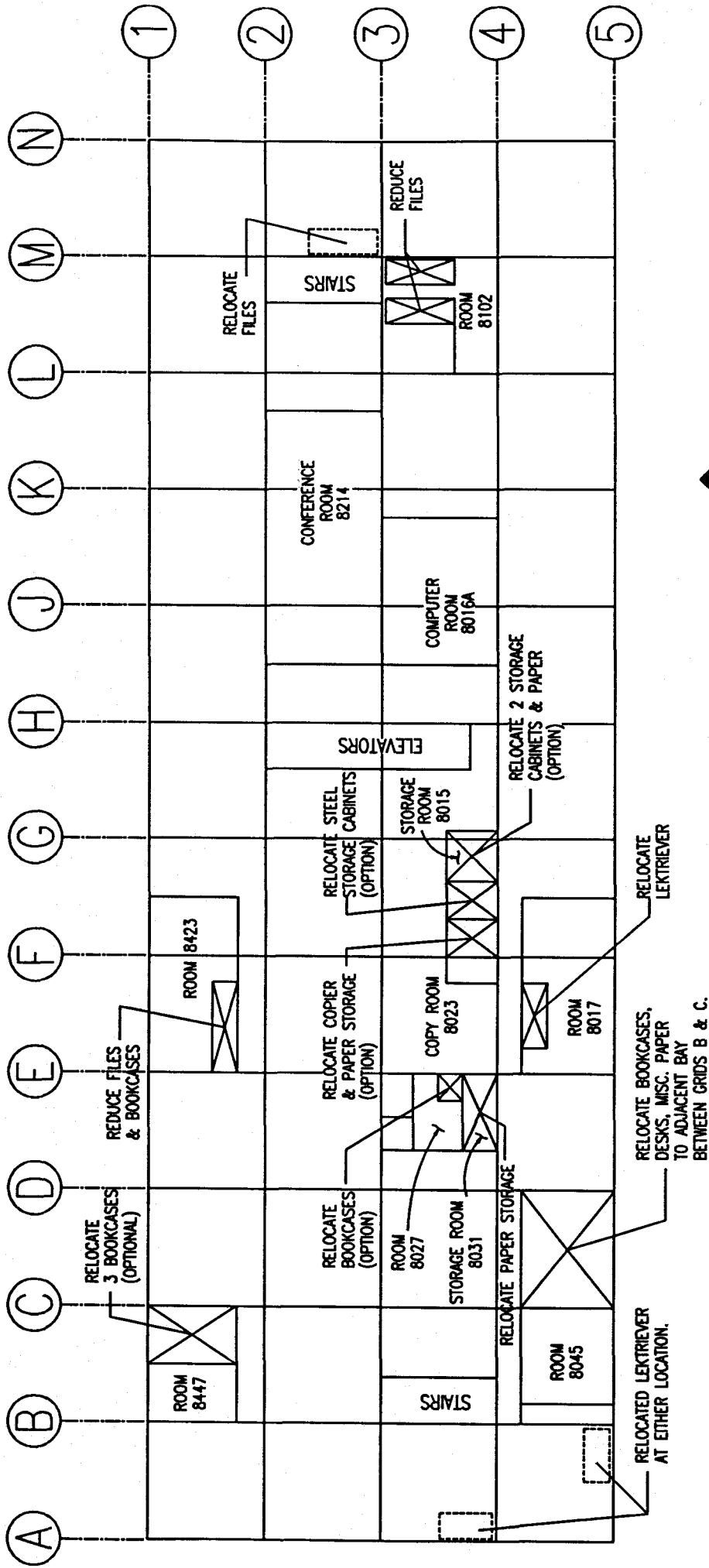
3. 20 PSF FOR MOVABLE PARTITIONS PER UBC REQUIREMENTS.

4. \* INDICATES EXISTING LIVE LOADS.

5. (XX) INDICATES LIVE LOAD REQUIRING REDUCTION.

ALBUQUERQUE FEDERAL BUILDING  
ALLOWABLE LIVE LOAD VS.  
EXISTING LIVE LOAD  
LEVEL 8

FIGURE 1



ALBUQUERQUE FEDERAL BUILDING  
LOAD REDUCTION PLAN

LEVEL 8

FIGURE 2